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Fighting the Bite: West Nile Virus Disease

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West Nile virus (WNV) disease was first reported in the Western Hemisphere in 1999 during an outbreak in New York City. Since then the virus has spread east to west to affect the entire continental United States. From 1999 through 2006, nearly 24,000 human WNV infections resulting in 962 deaths were reported to local and state health departments in the United States. Over 2,200 human infections were reported to the Public Health Agency of Canada from 2002 through 2006.

West Nile Virus Infection

Infection with WNV is most commonly asymptomtic, but can lead to West Nile fever or neuroinvasive West Nile disease. It is estimated that approximately 20% of people who become infected with WNV will develop West Nile fever. Symptoms include fever, headache, fatigue, and body aches, occasionally with a rash and swollen lymph glands. The symptoms of much rarer neuroinvasive disease are severe and include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. It is estimated that approximately 1 in 150 persons infected with WNV will develop this more severe form of the disease. Neuroinvasive WNV disease can occur in people of any age, however people over 50 years of age and some immunocompromised persons (for example, transplant patients) are at the highest risk for becoming severely ill when infected with WNV.

WNV is usually transmitted to humans by the bite of an infected mosquito. In a few cases the virus also has been transmitted by blood transfusion, organ transplantation, intrauterine infection, and possibly breastfeeding. Blood banks have been screening blood products for WNV infection since June of 2003 to prevent transfusion associated cases.

West Nile Virus In Washington State

Historically, Washington State has had reports of other arboviral (arthropod-borne viral) infections. Both St. Louis encephalitis and western equine encephalitis have occurred, primarily in eastern counties, but human infections with these arboviruses have not been identified for decades.

Continued page 2

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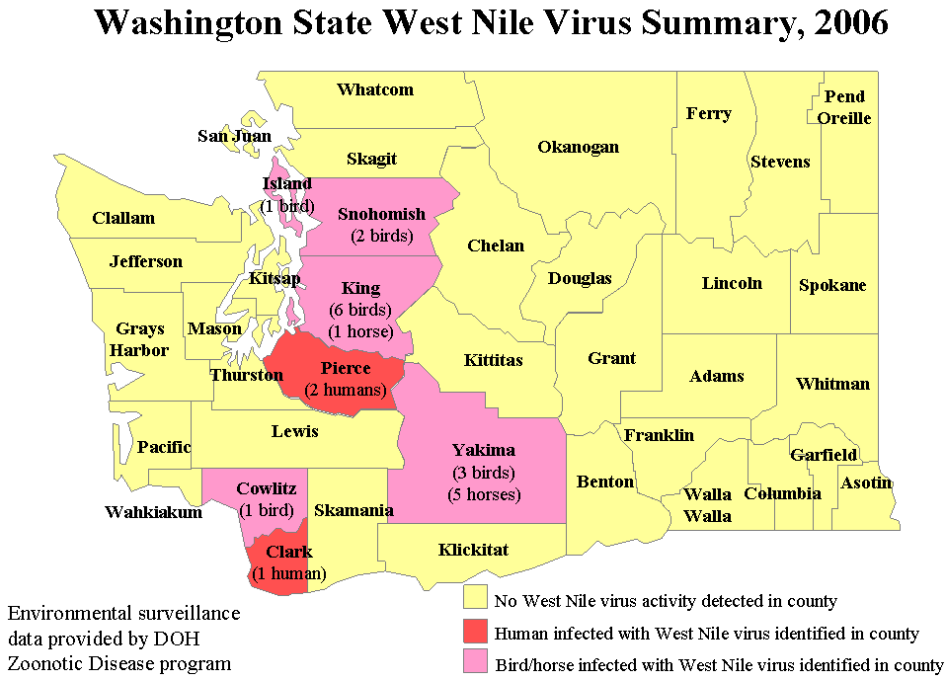
Washington State conducts surveillance for human, mosquito, bird, horse and other animal WNV infections. Horse and bird infections were first detected in 2002. A handful of Washington residents have been diagnosed with WNV but all cases were exposed outside of the state until 2006, when three confirmed human WNV infections acquired within Washington State were reported. In addition, the virus was detected in horses and birds last year (2006) (Figure 1).

Figure 1



Testing for West Nile Virus Disease

WNV or other arboviral diseases, such as St. Louis encephalitis, should be seriously considered in adults 50 years of age or older who have onset of unexplained encephalitis or meningitis in summer or fall. The diagnosis of WNV disease relies on a high index of clinical suspicion and on results of specific laboratory tests.

The most efficient diagnostic method is detection of IgM antibody to WNV in serum collected within 8 to 14 days of illness onset or in cerebrospinal fluid (CSF) collected within 3 to 8 days of illness onset. Testing of either specimen (serum or CSF) should be done using the IgM antibody-capture, enzyme-linked immunosorbent assay (MAC-ELISA). Since peripheral IgM antibody does not cross the blood-brain barrier, presence of IgM in CSF strongly suggests central nervous system infection.

Continued page 3

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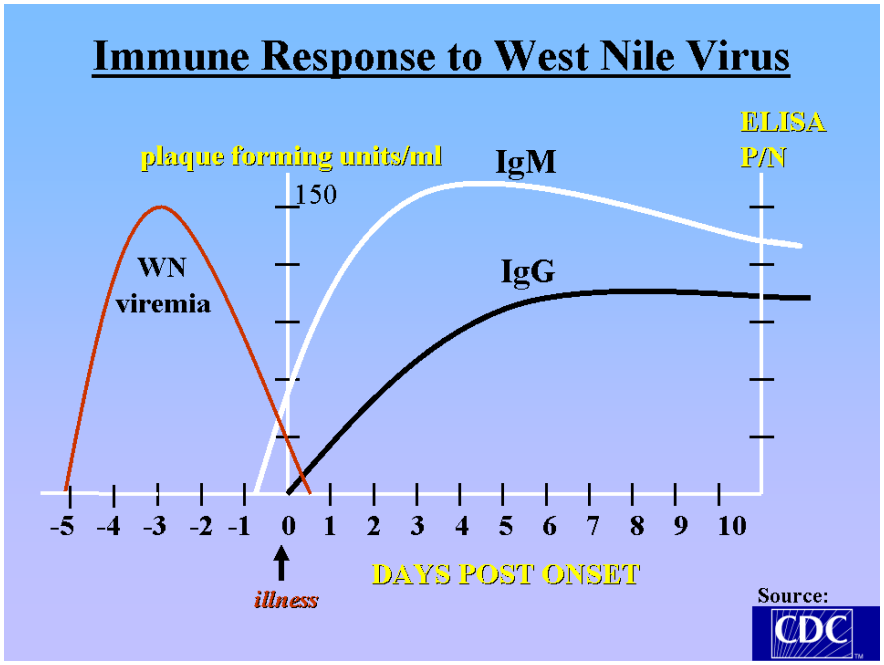
Because most infected persons are asymptomatic and because peripheral IgM antibody may persist for six months or longer, residents in endemic areas may have persistent IgM antibody from a previous infection that is unrelated to their current clinical illness. A four-fold rise in titer between acute-phase (collected 8 to 14 days after onset of illness) and convalescent-phase (collected 22 days or more after onset) serum specimens confirms an acute infection.

WNV is a RNA flavivirus that is antigenically similar to several medically important viruses associated with human encephalitis including: Japanese encephalitis, St. Louis encephalitis, Murray Valley encephalitis, Kunjin virus (an Australian subtype of WNV). Dengue and yellow fever viruses are also antigenically similar. This close relationship of the flaviviruses accounts for serologic cross-reactions observed in the diagnostic laboratory. Patients who have been recently vaccinated against or recently infected with related flaviviruses may have positive WNV MAC-ELISA results. Recent travel and vaccination history should be obtained for all patients with suspected WNV infection. For laboratory diagnosis, plaque-reduction neutralization test (PRNT), the most specific test for the arthropod-borne flaviviruses, can be used to help distinguish false-positive results in a WNV MAC-ELISA and help distinguish serologic cross-reactions among these other flaviviruses. PRNT can be preformed at the Centers for Disease Control and Prevention and at other reference laboratories.

Polymerase chain reaction (PCR) is sometimes requested for the diagnosis of WNV infections in humans, although it has limited usefulness because of the transient and low viremia after onset of symptoms (Figure 2). PCR assay may be performed on CSF or blood for evaluation of patients with immune dysfunction, but PCR is not recommended for routine diagnosis of WNV disease.

Figure 2



Serum or CSF can be refrigerated or frozen if submitting samples to a reference laboratory for testing for WNV.

Continued page 4

Testing at the Public Health Laboratories

PHL will provide testing for the following patients:

- Patients with suspected WNV neuroinvasive disease (fever and change in mental status, cerebrospinal fluid [CSF] pleocytosis, or other acute central or peripheral neurologic dysfunction) when there is no other likely diagnosis
- Pregnant or breastfeeding women symptomatic with suspected WNV infection and their neonates or breastfeeding infants
- Recent blood, tissue, or organ donors or recipients suspected to have WNV infections
- Persons with commercial laboratory evidence of WNV infection to confirm the diagnosis (until WNV disease is established in Washington State)

Testing at PHL will not be performed without approval of your local health jurisdiction and Washington State Department of Health Communicable Disease Epidemiology Section. Suspected or confirmed WNV and other arboviral infections are notifiable conditions in Washington. When you report a suspected WNV infection to your local health department, health department staff will request relevant information for case reporting and will facilitate testing at PHL.

Additional Resources

WA DOH website:
- http://www.doh.wa.gov/notify/nc/wnv.htm

Centers for Disease Control and Prevention:
- http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

West Nile Maps:
- http://diseasemaps.usgs.gov/